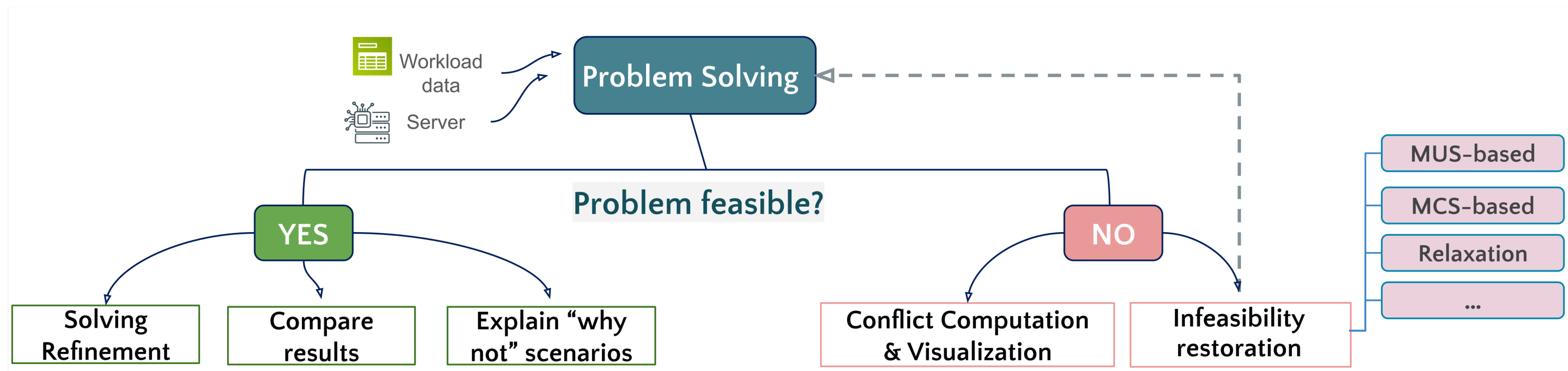


# Explainability in Planning and Scheduling

## INTRODUCTION & MOTIVATION

Effective planning and scheduling tools often struggle with scalability in large solution spaces, making it challenging to understand both the outcomes (“What”) and the reasons behind them (“Why”). The TUPLES project, hosted by ANITI, focuses on enhancing explainability in these tools to foster user trust create transparent and reliable decision-making solutions.

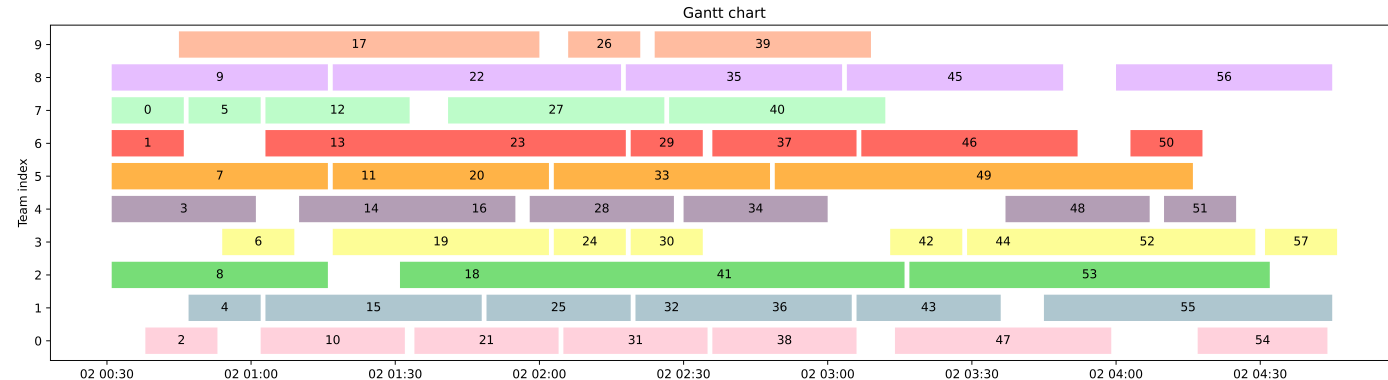
## Workflow for Scheduling & Planning



## Problem definition & Application example

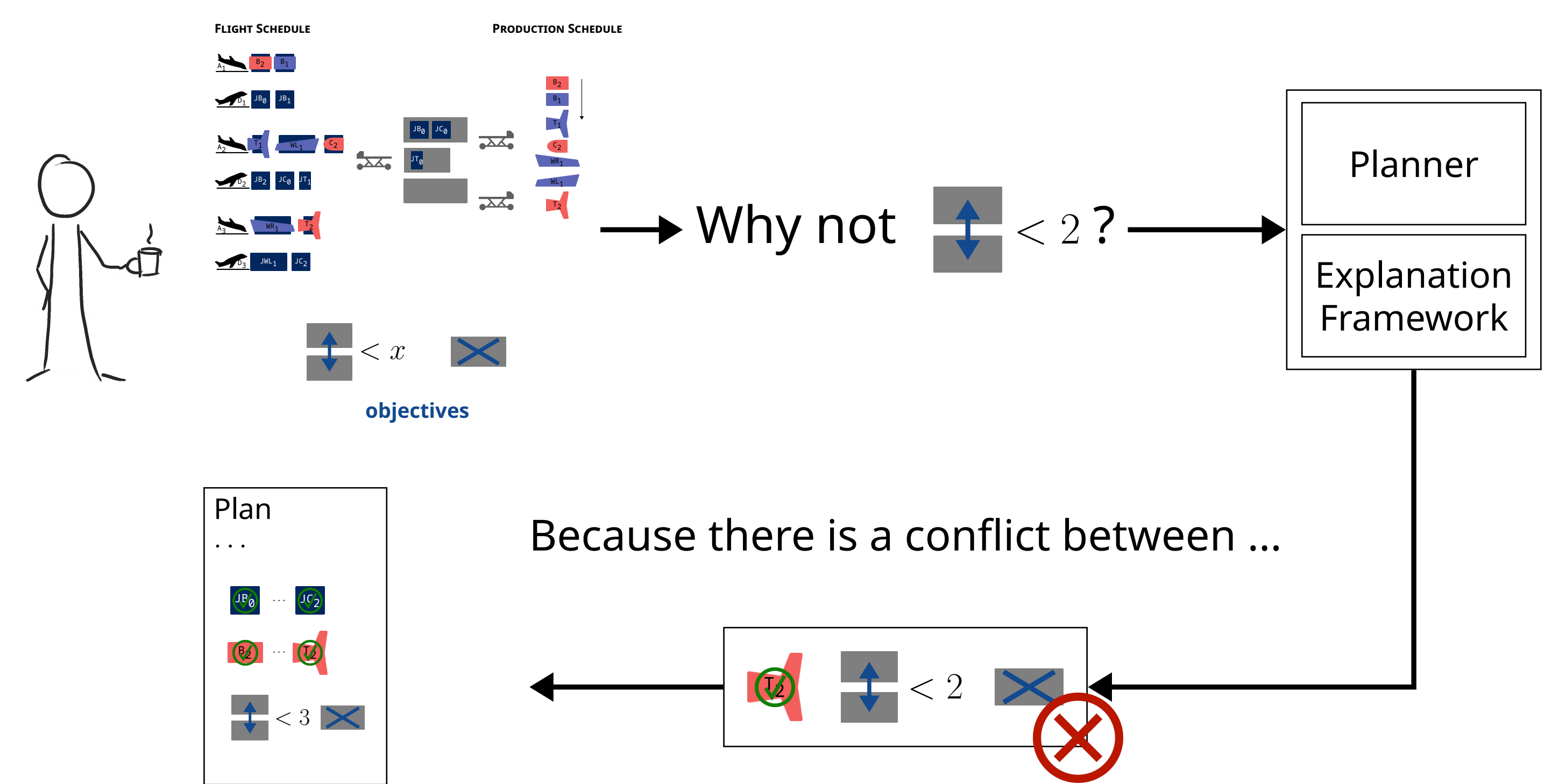
**Notations:** The workforce allocation problem is defined by tasks, teams, and constraints.

1. Teams are represented as  $T = \{t_1, t_2, \dots, t_n\}$ .
2. Tasks are represented as  $A = \{a_1, a_2, \dots, a_m\}$ .
3. Constraints include availability, skills, and priorities.



The goal is to assign tasks to teams while minimizing conflicts and satisfying all constraints.

## Iterative Planning with Conflict Explanations



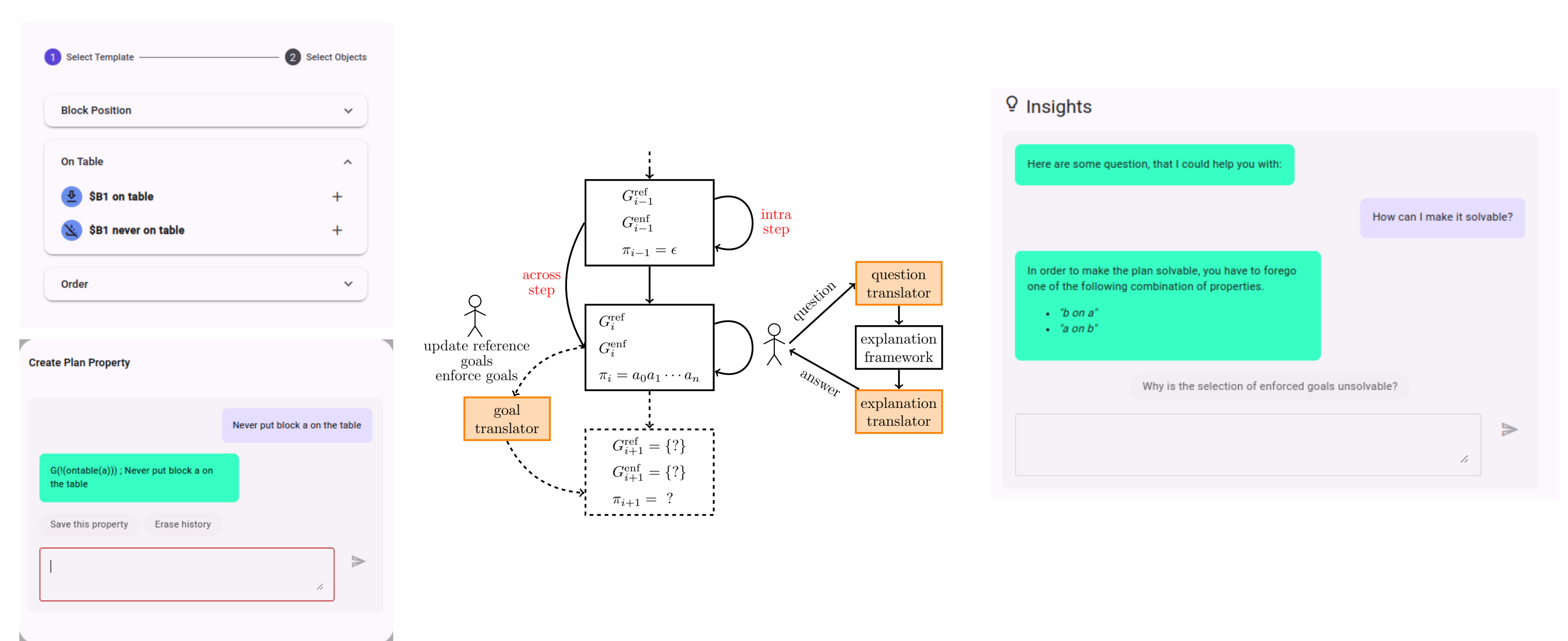
## Conflicts Identification & Resolution

### Interactive Restoration

1. **Local Conflict Resolution:** Step-by-step resolution of individual conflicts.
2. **Global Conflict Resolution:** Adjusting minimal sets of constraints to resolve infeasibilities.
3. **Task Prioritization:** Allowing users to adjust task weights and priorities for feasible scheduling.



## Interactive Planning and Explanations with LLMs



## Impact and Perspectives

By improving explainability, the TUPLES project addresses key barriers to AI adoption in industrial decision-making. Anticipated benefits include:

- Increased user trust and collaboration.
- Widespread adoption of explainable AI tools.
- Future integration of dynamic scheduling features to handle real-time disruptions. Next steps involve user-centered evaluations to refine visualizations and interactive features, paving the way for innovative and scalable AI-driven planning tools.

